

Robust Frequency Combs and Lasers for Optical Clocks and Sensing, Phase I

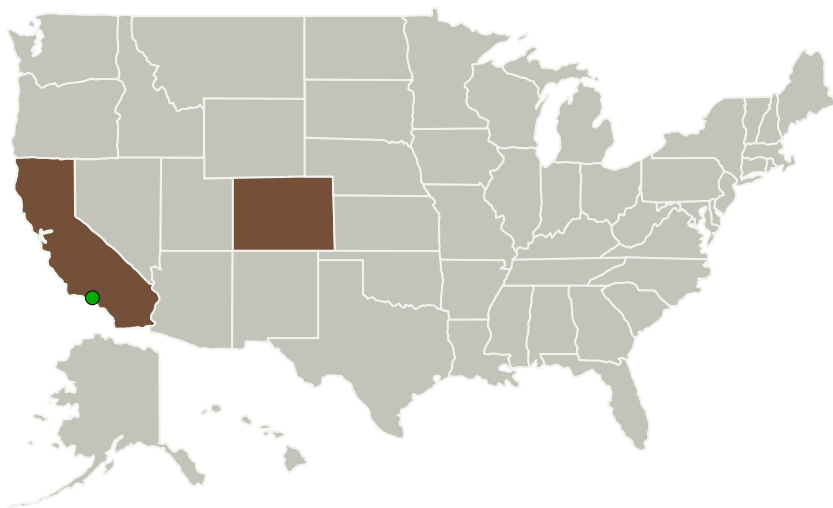
Completed Technology Project (2015 - 2015)



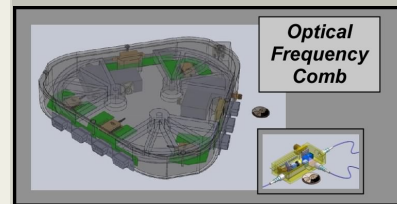
Project Introduction

Optical frequency combs are the key enabling technology that enabled the immense fractional stability of highly-stabilized lasers in the optical regime to be transferred to the RF domain and thus ushered in new generation of optical atomic clock with orders of magnitude improved stability over their RF atomic clock predecessors. Frequency combs have also found applications in spectroscopy, LIDAR, arbitrary waveform generation, and stable microwave oscillators. In Phase 1 Vescent will design, fabricate, and test a polarization maintaining fiber frequency comb useful for frequency stability transfer from the optical domain to the RF domain. Vescent will design and fabricate a fiber-coupled semiconductor saturable absorbing mirror with actuator to control the comb repetition rate. In Phase II Vescent will develop compact diode lasers that will conveniently phase lock to a comb tooth for the purpose of stabilizing a comb tooth or the laser diode.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Vescent Photonics, Inc.	Lead Organization	Industry	Arvada, Colorado
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California



Robust Frequency Combs and Lasers for Optical Clocks and Sensing, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Robust Frequency Combs and Lasers for Optical Clocks and Sensing, Phase I

Completed Technology Project (2015 - 2015)



Primary U.S. Work Locations

California

Colorado

Project Transitions

June 2015: Project Start

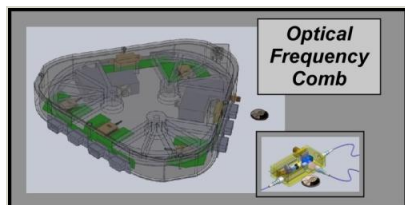
December 2015: Closed out

Closeout Summary: Robust Frequency Combs and Lasers for Optical Clocks and Sensing, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/139293>)

Images



Briefing Chart Image

Robust Frequency Combs and Lasers for Optical Clocks and Sensing, Phase I

(<https://techport.nasa.gov/image/126240>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vescent Photonics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

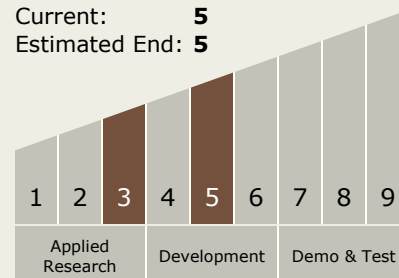
Carlos Torrez

Principal Investigator:

Juan M Pino

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Robust Frequency Combs and Lasers for Optical Clocks and Sensing, Phase I

Completed Technology Project (2015 - 2015)



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System